Can Geoelectrical Methods Be Used to Monitor Non-aqueous Phase Liquid Remediation Efforts?

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The U.S. Environmental Protection Agency's (U.S. EPA) Strategic Plan includes the research and development of improved methods for evaluating the long-term performance of monitored natural attenuation. This groundwater research need is part of Government Performance Results Act (GPRA) Goal 3, sub-objective 3.3.2 for Superfund and Oil Program Research Priorities and includes research and development for all non-aqueous phase liquid (NAPL) remediation. Geophysical techniques show promise as part of this research effort through the evaluation of NAPL remediation. Specifically, geoelectrical methods can detect changes in the conductivity of the subsurface as related to these remediation activities. This poster presents findings demonstrating that the electrical properties of remediated zones are altered due to remediation activities, and these changes are measurable by direct current geoelectrical methods. The electrical conductivity variation due to biodegradation of a light non-aqueous phase liquid (LNAPL) and the electrical conductivity changes that occur during surfactant flushing of a dense non-aqueous phase liquid (DNAPL) will be presented. Results from laboratory and field investigations of the biodegradation of diesel and of surfactant flushing of perchloroethylene (PCE) are presented. These studies suggest that, once implemented and validated at sites, analytical chemistry costs may be reduced, hazardous waste products from analyses may be reduced, and the capability to remotely and passively monitor the remediation process and protect our groundwater and soil resources are possible. This research is the result of partnerships with Western Michigan University, University of Missouri-Rolla, and the National Exposure Research Laboratory, Environmental Sciences Division in Las Vegas, NV. The results from this work are expected to be used by the Office of Solid Waste and Emergency Response (OSWER), project managers, responsible parties, and project implementers to efficiently and effectively monitor and characterize the remediation of LNAPL- and/or DNAPL-impacted sites.

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